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Ilva Shear

Unknown

ILVA SHEAR

BASICALLY, KINETIC ENERGY OF ROTATION IS -

$K.E. = \frac{1}{2} I \omega^2$ BY DEFINITION

WHERE I = MOMENT OF INERTIA

ω = ANGULAR VELOCITY

2. MOMENT OF INERTIA OF A MASS $I = \int r^2 dm = k^2 m$
IS IN UNITS OF $\underline{slug\ ft^2}$ or $\frac{lbf}{ft} sec^2 \times ft^2$

$= \underline{lbf\ ft\ sec^2}$

ANOTHER MEASURE OF MOMENT OF INERTIA IS Wk^2
WHICH IS $\underline{I \times 32.2}\ ft/sec^2 = \underline{lbf\ ft^2}$

3. ω = RADIANS/SECOND , N = RPM $\therefore \frac{\omega \times 60}{2\pi} = N$

OR $\omega \times 9.56 = N$

THEREFORE $K.E. = \frac{1}{2} I \omega^2$

$K.E. = \frac{1}{2} \frac{(Wk^2)}{32.2} \times \frac{N^2}{9.56^2} = \frac{Wk^2 N^2}{91.5 \times 32.2 \times 2}$

OR $\boxed{K.E. = \frac{Wk^2 N^2}{5880}}$ FT lb

4. A MACHINE (ILVA SHEAR) HAS A $Wk^2 = 151\ FT^2 lb$ AT THE MOTOR SHAFT. HOW FAST MUST THIS MACHINE BE RUN NOMINALLY SO THAT WHEN 2480 FT lb OF ENERGY IS GIVEN UP BY THE SYSTEM, THE SPEED DROP IS 50% ?

5. $KE_1 = f(\omega_1^2)$; $KE_2 = f(\omega_2^2)$

★ $KE_1 - KE_2 = f(\omega_1^2) - f(\omega_2^2) = f(\omega_1^2) - f[(1-x)\omega_1]^2$

$KE_1 - KE_2 = f[1-(1-x)^2]\omega_1^2 = [2x - x^2] f(\omega_1^2)$

(where x = speed drop)

$\therefore \underline{\Delta KE = [2x - x^2] KE_1}$ = ENERGY GIVEN UP IN SHEARING

WHERE $x = .5$, $2x - x^2 = 1 - .25 = .75$

$\therefore KE_1 = \frac{\Delta KE}{.75} = \frac{2480}{.75} = 3310$

ILVA SHEAR, CONT'D

6. RETURNING TO ITEM 3:

$$KE = \frac{Wk^2 N^2}{5880}$$

$$\therefore \quad N = \sqrt{\frac{5880\ KE}{Wk^2}}$$

$$\therefore \quad N = \sqrt{\frac{5880 \times 3310}{151}} = \sqrt{129000}$$

$$\boxed{N = 359\ RPM}$$

$\frac{650}{60}$

1.4×60

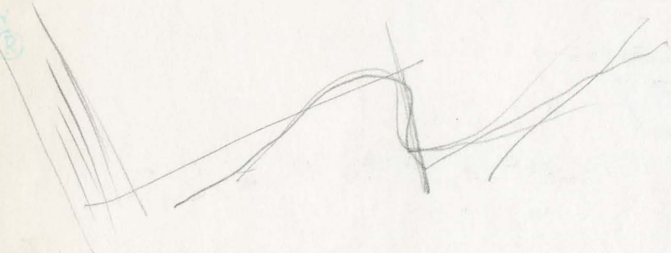
Ca = 1.72 sec

650 RPM

$\frac{650}{60}$

$\frac{81.8}{1.07} = 9.25$

$\frac{10.8}{140}$



25 ft @ 650 = x torque

$\frac{1.4}{2.7} \times 60$

$$\begin{array}{r} 65.3 \\ -6.5 \\ \hline 58.8 \\ 65.3 \\ \hline 124.1 \\ 62.1 \end{array}$$

$\boxed{\text{13" brake} \;|\; \text{550 ft lb}}$